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EXPERIENCE IN ORGANIZING OPERATIONS OF DETACHMENT NO 48

- USSR -

by I.A. Pcteyko

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Following is a translation of an article by I.A. Poteyko in Geodeziya i kartografiya (Geodesy and Cartography), No. 3, Moscow March 1960, pages 39-44.

In the course of many years, Detachment #48 has been accomplishing the topographic work for making large scale maps of the Far East area. The region of operations of the detachment is mountainous tundra with a well developed hydrographic net. The climate is sharp continental with a mean summer precipitation of 412 mm.

In spite of the difficult physical and geographic conditions, the personnel of the detachment successfully cope with the operational assignments yearly and systematically raise the quality of their work. The operational assignment for 1959 was fulfilled by 115.2%. In this figure are included third order leveling by 114%, horizontal and vertical preliminary preparation and interpretation of aerial photos by 113% and stereotopographic work by 126%.

The quality of the 1959 work as accepted by the Office of Technical Control is characterized by the following indicators: outstanding - 32%, good - 62%, satisfactory - 6%, inadequate - 0.1% (a level line of 27km was inadequate because of an unallowable error of closure).

Economic indicators of the work of the detachment are as follows:

- a) yearly number of operational personnel - 76% (of the normal TO)
- b) productivity of work - 138%
- c) cost of the work - 92.5% (of the planned cost)
- d) pay fund distributed - 94%

Detachment #48 is composed of five topographic parties (28-30 crews) and one office unit. Some thirty laborers of the field crews are permanent while the rest are seasonal.

The detachment has five motor trucks, one machine GAZ (probably a tractor), a freight cutter (boat), a hydroplane, several boats with outboard motors and 40 horses.

In the course of several years, each crew, composed of a topographer and two or three workers, completes in an assigned area, a variety of field operations, namely: horizontal and vertical preparatory work and interpretation of aerial photos and fourth order leveling. Third order leveling is done by separate crews.

After completing and turning in the work completed in the current year (in December in practice) the field workers are on furlough. After returning to the detachment, they begin preparations for the coming season. Preparatory work in the detachment is conducted in the following two directions:

- 1) organizational and supply problems
- 2) technical and operational questions

The first includes recruiting workers for the crews, supplying transport facilities, supplies, work clothes and transporting supplies and food to the working area. The second includes: technical training, obtaining aerial survey materials, basic (source) data, checking the instruments, and planning the work of horizontal and vertical preparation (control work). All this work is accomplished in the period Jan 1 to April 1.

The supply section of the detachment arranges for the transport of food and fodder into the taiga, driving the horses from the detachment base to the area of operations of the parties and concludes lease arrangements with kolkhozes for obtaining reindeer. The topographers are enlisted for this duty for a short period.

In the period between field seasons engineers and field technicians take courses to improve their qualifications for a half day while during the other half of the day accomplish their production assignments.

The topographic party chiefs, together with experienced topographers, compile the working plans for horizontal and vertical preparation (photo control) of aerial photos. They also allot working areas among the crews and give out orders and instructions. Besides this, the party chiefs verify that the crews have been issued instruments also, the timely and complete instrument check by the persons responsible. Usually by the 25 March all field crews are already properly set up with workers and supplied with means of transportation, instruments, supplies and work clothes. At the beginning of April there is already at the work site of most crews, a supply of food for 2-3 months and a portion of the other supplies. All this is kept in "storehouses", specially constructed in trees.

The detachment begins the field work each year in the first days of April when the snow has not yet disappeared from the taiga and the evening temperature is minus (C°). Field workers have found from experience that under conditions of the Far East, Spring work is most productive. In April and May, when the ground has not yet thawed, it is easier to move by pack animal and, besides this, conditiond for angular and linear measurements in the not yet leafed-out taiga are most favorable. Therefore, most field men, having received their seasonal assignment for operational (field) work, urgently attempt to get to the working site as early as possible. The detachment leadership supports by all means such initiative of the field workers and for its part employs efficient measures to make possible its accomplishment. It (the leadership) considers that, in spite of some increased loss

(additional supply of crews with winter clothing, greater consumption of fodder due to lack of pasturage, etc.), it is all later compensated for, since in the summer (July-August) in the region of our work, a rainy period sets in. During this period, the accomplishment of topographic and geodetic work is not only very difficult but at times impossible.

With an early beginning of field work, the crew successfully completes its operational assignments, even under very unfavorable climatic conditions. Beginning work in April, the topographers have time to do a 2-3 months quota before the rain and in the rainy period itself they process the data.

The field season of 1959 is characteristic of the above. Before the beginning of April, the detachment had already prepared for the field work and started operations. As a result of this by 1 August the yearly plan was fulfilled by 74% and the calendar plan by 130%. In other words, all planned field assignments had already been basically completed. In August there were 20 rainy days with great flooding of streams. At this time almost all the crews, having completed the field work, were located at the party bases processing field data and only eight crews were still working in the field completing assignments over and above the plan as authorized by the establishment at the request of the detachment.

Field work is organized in Detachment #48 in the following fashion. The topographer, having received his orders or instructions for the entire field season, knows beforehand his assignment and the time for its fulfillment. Because of this, he can organize the work of crew so that he can complete his assignment ahead of the time allotted. In our detachment there has been introduced the rule: only those who have fulfilled their seasonal assignment in field work can return to the detachment base and transfer to office work. Those desiring to work some more in the field get a supplementary assignment beyond that established earlier. Such rules to some extent aid in the rapid completion of the costly field work. Thus, toward the end of the season, (August-September) there usually remain in the field work only qualified operators (technicians) with the better laborers. In connection with the latter, the productivity of the crews lessens only slightly even in the autumn with unfavorable weather.

In giving out the orders and assignments to the crews the leadership of the detachment and the party chiefs consider the individual qualifications of the operator (experience, knowledge) in accordance with which they determine the season's operational assignments of each crew. The average assignment for a topographic crew is established as six sheets (area) of 1:25,000 scale on which must be fulfilled the horizontal and vertical preparation (field control) and interpretation of photos. Under existing work norms this comprises 115% of the assigned productivity corresponding to the socialist obligation of a crew of a detachment. During the field season of 1959 the leading crews of topographers G. A. Ligachev, G. A. Dyndar', M. T. Krasil'nikov and G. F. Trofimov completed the complex work of horizontal and vertical

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control and photointerpretation on 8-10 sheets. The productivity of the work of these crews was 160-190%.

The area in which Detachment #48 worked in 1959 is north of the 52° parallel and, for the most part is cut by mountain massives. Aerial photography at 1:25,000 scale was accomplished in 1954 with an aerial camera TE (Topograficheskiy Elektricheskiy) (f= 100mm). Some regions were photographed during haze, as a result of which part of the photos were of unsatisfactory quality. At the request of the detachment the aerial photography of these areas was repeated in 1959.

The 2nd and 3rd order of triangulation was established by geodetic Detachment #88. The construction of marks (signals) was completed in 1958 while the observations were conducted concurrently with the topographic work in 1959. The geodetic detachment transmitted to us the working coordinates of stations during the period 1 July to 15 October.

In the technical planning of the topographic work, it was planned to make horizontal ties of the photos to objects (identifiable), locating the horizontal picture points uniformly over the entire area of the survey, primarily in the side lap area. It was planned to develop the vertical net so that one vertical picture point would be included in every 6 km² of the photographed area, in which case the mean number of picture points per sheet area would be not less than 13. It was proposed to determine the horizontal and vertical control basically by the method of triangulation (57%).

In the work planning and actual accomplishment of the horizontal and vertical control, the planned figures underwent some change. For the sheet areas prepared in 1958-1959 the mean change per sheet was:

Horizontal picture points	----- 4
Vertical " "	----- 16
Total per sheet	----- 20 picture points

Of the total number of picture points coordinates were determined for 37% by triangulation. The remainder were the result of level lines, transit traverses and vertical traversing. In establishing transit traverses, range finder (stadia) attachment DNB-2 was utilized. Measuring tapes were not used. Angular and linear measurements were done in full accordance with the requirements of the regulations for topographic surveying.

It is gratifying that the majority of the operators of the detachment were conscientious about their work. Instances of re-runs were very few, in which cases their necessity was apparent not only through control lines but also to the operators (instrument men) in checking their work. The discovered inadequacies were promptly redone.

As stated above, fourth orders leveling was done by the topographers concurrently with the horizontal and vertical preparation of the photographs. In such a case temporary bench marks were distributed in the area more practically. The

topographers, accomplishing (besides this) also the vertical preparation, select the location of the temporary bench marks carefully, taking care that they are easily recognizable on the photos and, at the same time taking care that their position correspond to the requirements of stereocompilation.

As the field work was completed the topographers turned over their survey material to the party chief, who, after detailed examination and preliminary acceptance, transmitted the material to the detachment base. Here all field (measurement) books were checked. After checking, the field books were returned to the party. After completion of field work or in inclement weather (rain), topographers processed the results of field measurements, then they organized and systematized the material by corresponding sheets. The completed work was finally approved by the party chief. With the established order of operations where each topographer accomplishes all field and computing processes in an assigned area and turns over to the party chief the fully completed materials, the quality and productivity of the work were significantly raised.

We must say a few words about the work of the party chiefs. Under our conditions (taiga, sparsely populated places and poorly developed means of communication) where the sole means of movement (transport) is pack animal, it is impractical to form larger parties. It is most practical when the party is composed of five to six crews. Then it is possible for the chief of party to make timely and systematic checks of the work of the crews and direct them.

In our detachment the party chief is given the widest discretion and powers in the affairs of organizational and technical direction of the crews under him. For solving problems of supply a supply agent and a horseman are assigned to party chiefs. Party chiefs use transport means as they are needed and as they can be used. Horses of (belonging to) the detachment are distributed among parties in proper numbers. Fodder is delivered directly from the detachment. Where there is the slightest possibility of movement by auto transport the parties are furnished automobiles. In the case of existence of water routes the parties have available boats with outboard motors. Party chiefs transport themselves about the region of operations by pack animal (on party horses) and only in exceptional cases do they use leased reindeer. The supply of field crews during work is accomplished basically by the supply agent and his helper, the horseman. However, with early proper supply of products to the location of the crews, this work does not take much time.

Under the conditions of work of our detachment the party chiefs can not be completely relieved of custodial duties (supplies, food, etc) of course, nevertheless, the detachment could achieve such a state that 75%-80% of the time, party chiefs could attend to technical direction of the crews and to the control of the work, using the remaining time to solve organizational and custodial problems.

The number of field control (quality) checks completed directly by party chiefs in the summer season of 1959 are shown in the table. Intermediate or so-called "along the way" quick inspections and checks of materials are not included in the table.

Name of Party Chief	No. of Crews in Party	No. of Checks	No. of Operators (Instrument Men) <u>Visited by Party Chief in Season</u>		
			3 Times	4 Times	5 Times
S.S. Shmidt	5	20	1	3	1
I.A. Krivich	6	24	2	2	2
N.N. Samsonov	6	21	3	3	-
G.I. Kuz'mina	5	21	1	2	2
A.F. Aksinenko	5	18	3	1	1
Total	27	104	10	11	6

We consider that such a number of field checks completed by party chiefs under conditions of difficult movement and with poor communications with the crews (whose topographers have the proper qualifications and conduct operations of high quality), are completely sufficient.

As the field work is completed, the engineers and technicians of the parties switch to computation and processing of the field materials while the permanent laborers are made available to the detachment heads.

All office processing of field materials and their systematization is done under the direction of the party chief. As a rule, up to the completion of all work and turn over of the production to the detachment administration none of the engineering-technical personnel are detached.

A party usually transfers the completed production to the detachment administration in stages during the period from October to December 15 as the work is completed in each sheet frame. After that the survey materials are immediately shipped to the establishment (Aerogeodetic Establishment). In 1959 Detachment #48 sent to the establishment survey materials completed by it according to schedule. A part of the material was submitted ahead of time.

Stereo topographic operations have been organized (in operation) in the detachment since 1956. It is appropriate to mention that this method of surveying was introduced into our detachment exclusively because of the efforts of the chief engineer of the detachment, comrade V.N. Belykh. There was no organizational initiative in this respect from the establishment, however, the administration of the detachment considered it necessary to introduce the above named method of surveying. The inclusion of the

stereo topo method, besides everything else, solved two problems. In the first place, it created the opportunity to fully utilize in the work those engineers and technicians who, because of family circumstances, could not participate in the field work and in the second place, in the non-field season, to acquaint practically the field men and topographers with the processes of stereo topo surveying.

In the detachment, while a shortage of instruments is still felt, especially such as presicision stereometers and wide angle multiplexes, the detachment nevertheless fulfills yearly its stereotopo work, beginning with photolab work and ending with the compilation of the base manuscript. The quality of this work, by evaluation of the Office of Technical Control, is not less than that accomplished by the plant (office) of the establishment even though they use more advanced instruments.

In spite of the small importance assigned thses operations in the plan of the detachment, they have great signifiance in the business of preparing specialists of wide background. It can truthfully be said that topographers who have worked 3 to 4 years in our detachment will be valuable specialists with practical knowledge of all types and processes of field and plant topo operations.

In 1960 our detachment will fullfil a complex of topographic and geodetic operations. The assignment (quota) in stereo surveys is being increased to twice 1959. There will, of course, be additional difficulties but they do not frighten the personnel of the detachment who, having widely spread socialist competition, expect to honorably fullfil the plan of the second year of the Seven Year Plan.